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Banks, Financial Markets and Growth in Developed Countries

*A survey of the empirical
literature*

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Banks, Financial Markets, and Growth in Developed Countries: a Survey of the empirical literature*

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Abstract

We review the literature on finance and growth with a focus on developed countries. We find little evidence that increases in the traditional proxies for financial development will enhance growth in these countries. Potential explanations are that too much finance could exhibit decreasing returns, lead to misallocation of credit, or increase macroeconomic or systemic risk. Difficulties in measuring financial development could also play a role. In addition, the empirical literature suggests that to stimulate efficient financial intermediation policy makers should focus on lending to firms instead of consumers; avoid too high concentration levels; and keep government ownership of banks at a minimum.

Keywords: literature review, financial intermediation, growth, competition, government ownership of banks

JEL classification: G01, G38

1 Introduction

The financial crisis has renewed the interest in the discussion relating financial sector characteristics and growth. Policy makers increasingly wonder what an optimal financial sector should look like. Relevant questions include: Can a financial sector be too big or too concentrated? Is foreign entry beneficial or not? What is a growth-promoting way to improve the functioning of the financial sector? We aim to provide policy makers with

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some guidance in addressing these questions by critically reviewing the literature on finance and growth, with a specific focus on developed countries.

Economic theory provides several arguments suggesting a positive relation between more efficient financial intermediation and growth. Levine (2005) argues that financial systems: (1) produce information ex ante about possible investments and allocate capital, (2) monitor investments and exert corporate governance after providing finance, (3) facilitate the trading, diversification, and management of risk, (4) mobilize and pool savings, and (5) ease the exchange of goods and services.¹

In line with these arguments, most observers would agree that efficient financial intermediation improves the allocation of capital (Wurgler, 2000; Fisman and Love, 2007) and contributes to GDP growth by increasing total factor productivity (Beck et al., 2000). Levine (1997) reviews the theoretical and empirical literature that focuses on the link between finance and growth. He concludes that a "preponderance of theoretical reasoning and empirical evidence suggests a positive first-order relationship between financial development and economic growth".

Because the level of efficiency of financial intermediation is not directly observable, the empirical literature uses several proxies for financial development. The most common are measures of credit to the private sector², the ratio of commercial to central bank assets³, liquid liabilities in the economy⁴, stock market size, and stock market turnover. In the rest of this review, we use the terms efficient financial intermediation, financial development and depth of financial markets interchangeably.

Based on reviews such as Levine (1997) and part of the existing literature, one might be tempted to conclude that 'the more the better'. Wachtel (2003) puts some numbers on the value of increasing financial development. An increase of the private credit-to-GDP ratio of 10 percentage points would result in a 0.5 to 1 percentage points increase in the real per capita GDP growth rate. Increasing the ratio of broad money (M3) to GDP by 10 percentage points would increase the rate of growth by between 0.6 and 1 percentage points a year. An increase of 10 percent in the value traded to GDP per year would add 0.5 percentage points to growth.⁵ These figures suggest huge benefits from larger financial sectors or deeper financial markets.

¹Most of the empirical literature discussed in this review is not able to distinguish between the different channels through which financial development may enhance growth.

²This can be bank and non-bank credit to the private sector, deposit money banks and other financial institutions credit to the private sector, or, even more restrictive, deposit money banks credit to the private sector.

³The intuition is that banks are more able at identifying profitable investments, monitoring managers, facilitating risk management, and mobilizing savings compared to central banks.

⁴Defined as currency plus demand and interest-bearing liabilities of banks and non-bank intermediaries.

⁵Based on (Rousseau and Wachtel, 2000).

However, a first observation from our critical reading of the literature is that this relatively optimistic pre-crisis interpretation of the empirical literature is being replaced with a more cautious one. Indeed, we conclude there is no evidence that increases in the measures traditionally used as proxies for financial development will enhance growth in developed countries. This lack of impact of financial development is related to the decreasing returns to financial development found in the more recent literature, which implies that linear models may suffer from misspecification. In addition, the extent to which a potential growth-promoting effect is permanent or temporary has received limited attention in the academic literature, although it is crucial from a policy perspective.

Several compounding effects can explain decreasing returns. First, at higher levels of financial development the low-hanging fruit may have been reaped. Second, more credit can go hand-in-hand with a partial misallocation of that credit, for example when a substantial increase in credit is due to rapid growth in real estate markets. Third, at higher levels of economic development, the traditional measures may no longer capture the level of financial development. Instead, one should look for measures that capture the quality of bank lending. Fourth, bigger financial sectors may also increase the risk of a banking crisis or macroeconomic volatility.

Decreasing returns do not preclude the view that more efficient financial intermediation increases the efficient allocation of capital. Indeed, depending on the root causes of decreasing returns, more efficient financial intermediation may still be conducive to growth. However, the literature provides limited guidance to answer the question: What operationalizes more efficient financial intermediation? The exact nature of growth-promoting measures for developed countries therefore remains a topic that requires future research.

Nevertheless, we draw the following conclusions: (1) the beneficial effect of increased efficiency of finance comes mainly through increased lending to firms not through increased consumer credit; (2) high concentration levels increase loan rates, although small firms may benefit from the presence of a large bank; and (3) government ownership of banks negatively impacts bank efficiency, although this effect may be mitigated in developed countries.

This suggests the following policy measures: (1) policy makers should focus on lending to firms; (2) high concentration levels should be avoided, but having some big banks is not necessarily problematic; (3) policy makers should strive to lower entry barriers; and (4) government ownership of banks should be kept to a minimum.

The set-up of this review is as follows. In section 2, we review the effect of finance on growth of the most commonly used indicator, e.g. bank credit to the private sector. We do a small meta-study, which gives an idea of the relevant magnitude of a potential effect as well as the spread in estimates. In section 3 we discuss the standard practise in most of the finance-and-growth

literature of implicitly assuming endogenous growth and contrast it with the minority of papers looking at neo-classical growth. In section 4 we highlight the finding in the more recent literature that the relationship between finance and growth may be nonlinear and discuss potential explanations for this nonlinearity, which include the absence of low-hanging fruit in more financially developed countries, increased systemic risk or volatility, and difficulties in finding adequate proxies for efficient intermediation. Section 5 discusses what the finance and growth literature has to say on the impact of the structure of financial markets on growth. We look at market-based versus bank-based finance, competition, and government ownership.

2 Finance and GDP Growth—a First Look

In this section we take a first look at the relation between financial development and GDP growth. We focus on a group of broad cross country studies that estimate the direct effect of financial development on growth. We use studies that are either published or often cited, but our selection is not exhaustive. For this group of studies, we quantitatively compare the implications of the group of broad cross country studies for developed countries (and in particular for the Netherlands) of a group of broad cross country studies that estimate the direct effect of financial development on growth.⁶

Our quantitative comparison considers 12 papers in total, published between 1993 and 2011.⁷ While the papers included in this comparison use different regressors, the dependent variable is always GDP growth.⁸ An important issue in growth regressions is causality. Does financial development lead to growth or does growth lead to financial development? Different papers try to address causality in different ways: by using initial values for financial development (King and Levine, 1993), using instrumental variables such as legal origin (Levine, 1998), or by resorting to lagged values as weak instruments in so-called system-GMM estimation (Beck et al., 2000). As such, we can quantitatively compare the papers by looking at the cross-country differences in growth that their estimates imply given the differences in financial development across those countries.

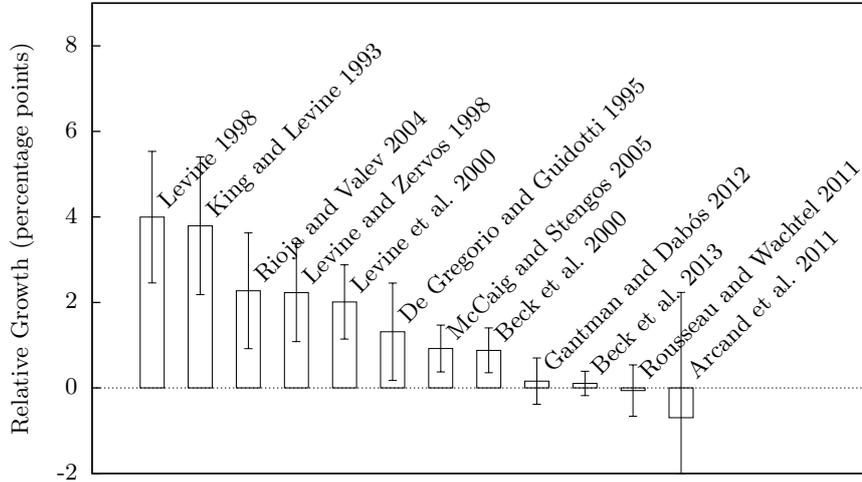
For each paper, we reconstruct their original financial regressors (such as bank credit to the private sector, broad money, commercial bank assets relative to commercial bank assets plus central bank assets) using data from

⁶The data and programs used by the authors the analysis in this section are available upon request.

⁷The papers are: King and Levine (1993), Gregorio and Guidotti (1995), Levine (1998), Levine and Zervos (1998), Levine et al. (2000), Beck et al. (2000), Rioja and Valev (2004a), McCaig and Stengos (2005), Arcand et al. (2011), Rousseau and Wachtel (2011), Gantman and Dabos (2012), and Beck et al. (2013).

⁸Alternatively, some studies use real capital stock or a measure of total factor productivity growth as dependent variable.

Figure 1: Predicted growth in the Netherlands relative to OECD average



The figure plots growth in the Netherlands, given its characteristics, relative to the average OECD country as predicted by the estimates in a given paper. Financial development data are from IFS averaged over the years 2000–2012.

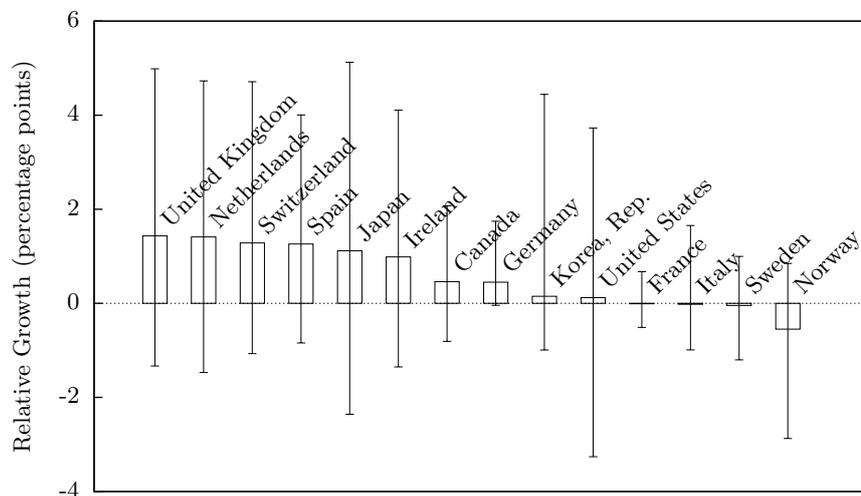
the IMF’s International Financial Statistics and the World Bank. We use data for 33 OECD countries (excluding Slovenia due to some data problems). Using the original papers’ specification⁹ and their estimation results, we calculate predicted growth in the Netherlands relative to the OECD average (Fig. 1) and predicted growth in individual countries to the OECD average according to each paper (Fig. 2), using the financial characteristics of each country. Appendix 6 gives more details concerning the exact calculations.

Fig. 1 and Fig. 2 present the results of our small meta-study. Fig. 1 looks at GDP growth in the Netherlands in comparison to the OECD average. According to Levine (1998), the Netherlands should have grown almost 4 percentage point faster than the average OECD country, while according to Arcand et al. (2011) growth should have been less than the OECD average. Fig. 2 looks at GDP growth in some of the larger OECD countries in comparison to the OECD average. The growth means and confidence intervals have been computed by assigning the predicted values of each of the papers an equal weight. According to these figures, Japan should have grown at 1.12 pp faster than the OECD average, given Japan’s exceptionally high level of private credit and liquid liabilities (M3) in relation to GDP. Norway should have grown 0.55 pp slower than the average.

Two things are worth noting. First, Fig. 2 shows that while the effect of financial development on growth can be potentially sizeable, the differences across the major world economies like the US, France and Germany are

⁹For example, whether specifications are logarithmic or not.

Figure 2: Predicted growth in individual countries relative to OECD average



The figure plots how fast or slow OECD countries should have grown relative to the average OECD country given their levels of financial development. The error bars give 95% confidence intervals. Financial development data are from IFS averaged over the years 2000–2012.

small. Second, while most paper that we consider predicts a significant and positive effect given the overly higher level of financial development in the Netherlands, the estimates across the papers themselves vary significantly.

A number of studies in Fig. 1 find relatively large effects. The earliest such study is King and Levine (1993) on the relation between financial development and productivity growth, capital accumulation, and GDP growth. They test whether the initial level of a country’s financial development, predicts growth for the following decade. They find that an increase in financial development from its bottom quartile to its top quartile contributes around 1 pp to growth. Levine (1998) relates long-run growth, capital accumulation and productivity growth to variation in the size of the banking sector. The author does cross-section instrumental analysis, using creditor rights and law enforcement as instruments. He finds that a one standard deviation increase in both law enforcement and creditor rights would result, via a larger banking sector, in a 2 pp increase in the growth of GDP per capita. Levine and Zervos (1998) study the effect of bank and capital market development on various growth measures. The authors use initial levels of bank and capital market development and control for other factors common in the growth literature. Bank development and market liquidity foster GDP growth, capital formation, and productivity growth; a one standard deviation improvement in bank development or market liquidity raises GDP growth by 0.7 pp and 0.8 pp respectively. Levine et al. (2000) study

whether financial development—as measured by larger liquid liabilities, or smaller relative assets of the central bank, or larger private credit—has a positive effect on growth. They use country-level panel data and dynamic panel GMM estimators. The authors find all three regressors to be significant and economically sizeable: a 20 pp increase in financial development causes a roughly 0.5 pp increase in GDP growth. Beck et al. (2000) aim to identify the channels—capital accumulation and/or productivity growth—through which financial development facilitates growth. The authors use country-level panel data and dynamic panel GMM estimators. The authors find robust evidence that financial development causes productivity growth, but find only tentative evidence with regard to capital accumulation. McCaig and Stengos (2005) examine whether financial development influences economic growth using several instruments.¹⁰ They find a positive effect on growth when financial intermediation is measured by liquid liabilities to GDP and private credit to GDP. The link between the ratio of commercial to central bank assets and growth is considerably weaker. Papers included in our comparison that also find relatively large effects but will be discussed in more detail in sections below are Rioja and Valev (2004a) and Gregorio and Guidotti (1995).

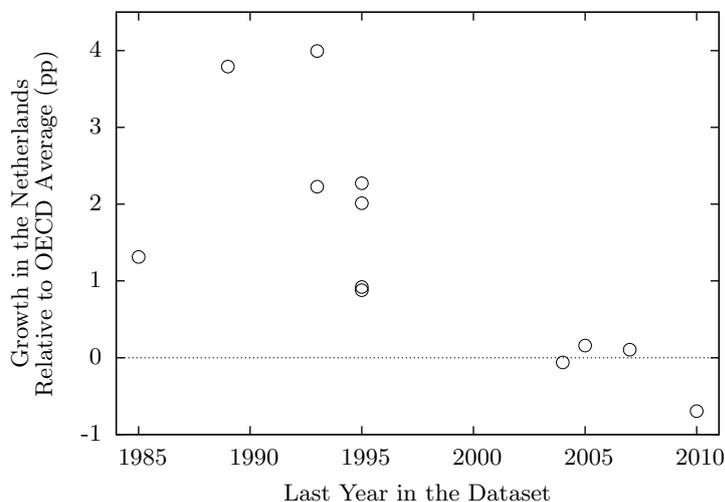
Other studies, however, find much lower effects of financial development on growth. Gantman and Dabos (2012) apply GMM system estimation to an unbalanced panel of 98 countries covering 9 five-year periods from 1961 to 2005. They find that financial development (as measured by total credit to the private sector from banks and other financial institutions) does not have a statistically significant effect on economic growth. Papers included in our comparison that also find small or no effects but will be discussed in more detail in sections below are Arcand et al. (2011), Rousseau and Wachtel (2011), Beck et al. (2013).

Crucially, papers with later dates of publication have much lower estimates of the effect of increased levels of credit to the private sector on growth. Effectively these studies find no impact at all and sometimes even a negative impact. The date of publication can be misleading, however, because recent papers might use older data. For example, McCaig and Stengos (2005), use the same data as Levine et al. (2000) that range from 1965 until 1995. To address this issue, Fig. 3 takes the per-paper growth estimates from Fig. 1 and plots them against the last years of those papers' data. If we regress growth on last year of data using weighted least squares, so as to account for the differences in variances shown in Fig. 1, we obtain a negative coefficient of -0.11 that is significant at the 5% level (p-value equals 0.002).

All in all, the analysis presented above does not suggest a preponderance of empirical evidence for developed countries that shows a positive

¹⁰religious composition, the fraction of years of independence since 1776, absolute latitude, European settler mortality rates and ethnic fractionalization

Figure 3: Evolution of Predicted Growth



Based on the numbers from Fig. 1, this figure plots predicted growth in the Netherlands, per paper, against the last year of that paper’s data.

effect of financial development on growth. There is no convincing evidence that increases in the measures traditionally used as proxies for financial development will enhance growth in developed countries, even though early papers show a significant positive impact. Consequently, the differences in financial development between the countries such as the US, the UK, Germany, France and the Netherlands do not result in differences in growth. Thus, the papers considered here do not provide a rationale for a country like the Netherlands to develop its markets so that it approaches either the US, the UK, or Germany. We will discuss potential interpretations of these findings in the sections below

3 Neoclassical or Endogenous Growth

An assessment of the impact on growth of a one-time improvement in financial intermediation, for example a liberalization of the banking system, depends strongly on whether one assumes endogenous or neoclassical growth. Under the assumption of endogenous growth—in essence, assuming increasing or constant returns to knowledge or other similar resources—it will lead to a permanent shift in growth. Under neoclassical growth, which assumes decreasing returns, it will only shift the level of GDP and consequently cause a temporary shift in growth. Most of the papers covered in this review implicitly assume endogenous growth. In this section we discuss the few that, to some degree, do not.

Most empirical papers do not make an explicit distinction between the

two theories but implicitly adopt one or the other. For example, Levine et al. (2000) regress the GDP *growth rate* on the level of financial development (using weak instruments to mitigate endogeneity concerns). Arguably, their approach is consistent with the endogenous growth theory as an increase in the level of development will have a permanent effect on growth. In contrast, Arestis et al. (2001) regress the GDP *level* on the level of financial development. The authors employ an error correction specification and, accordingly, a one time improvement in financial intermediation will cause only a temporary increase in growth. Their model is consistent with the neoclassical theory.

Several time series studies use such a vector error correction specification. Demetriades and Hussein (1996), Luintel and Khan (1999), Arestis et al. (2001) and Christopoulos and Tsionas (2004) focus on the level of GDP as opposed to the growth of GDP, primarily due to the requirement that all the involved variables be $I(1)$ ¹¹, so that cointegration relationships can be explored.¹²

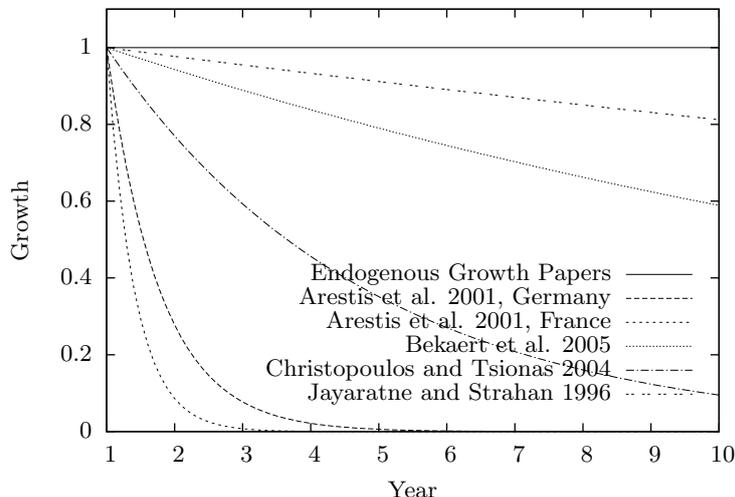
Unfortunately, none of these studies explores what their VECM specifications and estimation results imply for how the effect on growth decreases over time. However, in the case of Arestis et al. (2001) and Christopoulos and Tsionas (2004), it is possible to do a back-of-the-envelope calculation. Using the results of Arestis et al. (2001), we obtain that, for example, in Germany a 10 pp increase in the ratio of bank credit to GDP increases growth by 0.7 pp in the first year, by 0.2 pp in the second year, and has a negligible impact after the third year. Using the results of Christopoulos and Tsionas (2004), we obtain that a 10 pp increase in bank deposits to GDP increases growth by 3 pp in the first year and stays above 1 pp per annum during the first four years.

A couple of papers focus on the consequences of financial liberalization and ask, among other questions, how long the impact lasts. Jayaratne and Strahan (1996) look at the bank branch deregulation in the US in the 1980's that allowed banks to operate across state borders. They find that the bank branch deregulation increased income growth by 0.59 pp per annum during the first five years, by 0.86 pp per annum during the next 5 years, and that the effect faded after ten years when it became 0.34 pp per annum. Bekaert et al. (2005) define financial liberalization as the possibility for foreign investors to transact in local securities and vice versa, and assess the impact of such liberalization for 95 countries. They find that world-wide financial liberalization increased growth by 1.3 pp per annum during the first three years, by 0.77 pp per annum during the next two years, and by only 0.51 pp per annum during the following five years.

¹¹A stochastic variable is $I(1)$ if the first difference of the variable is stationary.

¹²Loayza and Rancière (2006) exemplifies a time-series study that looks at the growth of GDP instead.

Figure 4: Growth Dynamics



Notes: for the ease of comparison, fitted exponential functions are given in place of the original growth numbers and the growth in the first year is normalized to 1pp.

Fig. 4 plots the growth dynamics from the aforementioned papers. Focussing only on the papers within the neoclassical growth model, the half-life of the impact of financial development on growth ranges from 0.3 years (Arestis et al., 2001) to 30 years (Jayaratne and Strahan, 1996).

4 Nonlinearities

Many papers in the finance and growth literature pay little attention to potential nonlinearities. However, a growing number of papers that does allow for nonlinearities tends to find that the effect of more financial development on growth decreases with increasing financial development.

Several studies do cross-country analyses, and include non-linear terms, for example, by introducing terms quadratic in financial development, by allowing for threshold effects, or by including dummy variables. Favara (2003) in an early but unpublished paper uses a semi-parametric specification that allows for heterogeneity across countries and time, with data on 85 countries from 1960 to 1998. He finds a nonlinear relationship between financial development (measured by the amount of credit to the private sector by banks and other financial institutions) and growth of per capita income. The relationship is increasing at intermediate levels of financial development, but decreasing at very high or very low levels. He also finds evidence of cross-country heterogeneity. Rioja and Valev (2004a) examine a panel of 74 countries over the period 1960-1995 using system GMM estimators and include dummy variables for low, medium and high levels of financial

development. Financial development (credit to the private sector, liquid liabilities and commercial versus central bank assets)¹³ has no effect on growth for low levels of financial development, positive and strong for intermediate levels and decreases again at high levels. Stengos and Liang (2005) use a semi-parametric specification for 66 countries over the period 1961-1995. Depending on the type of indicator used for financial development, they find evidence for nonlinear effects. The effect is positive and nonlinear when using liquid liabilities¹⁴ as a percentage of GDP and linear but statistically insignificant when using private credit as a percentage of GDP. Shen and Lee (2006) use data from 48 countries for the period 1976-2001. In a linear specification, they find a positive effect of stock market development on growth, but a negative effect of bank credit to the private sector. However, upon including a quadratic term of bank credit to the private sector and liquid liabilities¹⁵, the relationship between growth and bank credit to the private sector exhibits a weakly inverted U-shape. Cecchetti et al. (2011) use data on 18 OECD countries from 1980 to 2010. They apply a dynamic panel data model with country fixed-effects and allow for threshold effects. For non-financial corporate debt as a percentage of GDP they find negative effect on growth above a threshold at about 90%. Cecchetti and Kharroubi (2012) study 50 countries over the period 1980–2009. They find an inverted U-shape relation between the level of financial development¹⁶ and growth. For private credit the turning point lies around 100% of GDP. For bank credit to the private sector the turning point is closer to 90% of GDP. When measuring financial development as the financial sector’s share in total employment¹⁷, a larger financial sector becomes a drag on growth when the share in total employment lies above 3.8%.

A couple of studies use the methodology developed by Rajan and Zingales (1998) (referred to as the RZ methodology in the rest of this review) that partially addresses reverse causality and has been widely followed in the literature. Rajan and Zingales (1998) ask whether financial development (the ratio of domestic credit plus stock market capitalization to GDP) fosters growth. To address reverse causality, they construct an index of industry dependence on external finance, defined as capital expenditures minus cash

¹³Credit to the private sector equals credit issued by deposit money banks and other financial institutions to the private sector. Liquid liabilities equals currency plus demand and interest-bearing liabilities of banks and non-bank financial intermediaries as percentage of GDP. Commercial versus central bank assets equals commercial bank assets divided by commercial bank plus central bank assets.

¹⁴Defined as currency plus demand and interest-bearing liabilities of banks and non-bank intermediaries.

¹⁵Currency held outside the banking system plus demand and interest bearing liabilities of banks and non-bank financial intermediaries.

¹⁶As measured by private credit to GDP, private credit by banks to GDP, bank deposits to GDP, financial system deposits to GDP, or bank assets to GDP.

¹⁷Which restricts the sample to 21 OECD countries.

flow from operations divided by capital expenditures, that is computed using US data. They argue that this dependence is technologically determined and hence exogenously given. By studying in a panel setting whether the interaction term between some country characteristic such as financial development and industry external dependence is significant, they can both address omitted variable bias and reduce the possible mechanisms that lead to reverse causality.¹⁸

The use of cross-industry data allows to mitigate some of the concerns related to reverse causality and therefore strengthens a paper's conclusions. Masten et al. (2008) apply system GMM with dummy variables for financial development on 31 European countries for the period 1996-2004.¹⁹ They find a positive effect of financial development on growth when it lies between 90% and 160% of GDP and an insignificant effect above or below those levels. They also apply the RZ-methodology for 30 European countries for the period 1996-2003 allowing for threshold effects. Above a threshold of 53% the effect of financial development²⁰ on growth is insignificant. Arcand et al. (2011) present the most elaborate and well-executed study of nonlinear effects to date. They use OLS, system GMM and the RZ methodology to study nonlinear effects of total private credit to GDP²¹, both by including a quadratic term and by using a semi-parametric specification. In their broadest estimates, they use data for 1960-2010. They find that the relationship between financial development²² and growth turns negative at high levels of financial development. Depending on the method used, their estimates of the approximate turning point vary between 70% and 110% private credit to GDP. The positive relation between financial development and growth becomes statistically insignificant when this ratio reaches around 40%.

The overall picture emerging from this literature is twofold. First, financial development as measured by credit to the private sector exhibits decreasing marginal returns. The most comprehensive study (by Arcand et al. (2011)) gives an estimate of a turning point somewhere between 70% and 110% private credit to GDP. Second, empirical estimates provide no evidence that benefits exist in terms of increased GDP growth from increasing credit to the private sector by deposit banks and other financial institutions above a certain threshold.

In the sections below, we discuss how nonlinear effects may explain the

¹⁸The authors find that an industry at the 75th percentile of financial dependence, located in a country that is at the 75th percentile of financial development, grows 1.3 pp faster than an industry at the 25th percentile of financial dependence, located in a country that is at the 25th percentile of financial development.

¹⁹Consisting of EU27, Croatia, Ukraine, Russian Federation, Iceland, and Norway

²⁰Measured as the sum of stock market capitalisation and domestic credit.

²¹Defined as total credit to the private sector extended by deposit banks and other financial institutions, as in King and Levine (1993).

²²Measured as total credit to the private sector by deposit banks and other financial institutions.

findings in the literature of a decreasing impact of financial development on growth over time. We also can arise because the measures commonly used in the literature may not capture increases in efficiency of financial intermediation, while a larger financial sector may also come at a cost because of increased financial instability or other distortionary effects.

4.1 Decreasing Effect over Time?

A concave nonlinear effect, in other words diminishing returns to more finance, would result in decreasing estimates for the effect on financial development over time because the level of bank credit to the private sector has risen substantially in many countries over the past two decades, as shown in Fig. 5. When the relationship is nonlinear, at low levels an increase in financial development will enhance growth, while at high levels there would be no effect on growth.

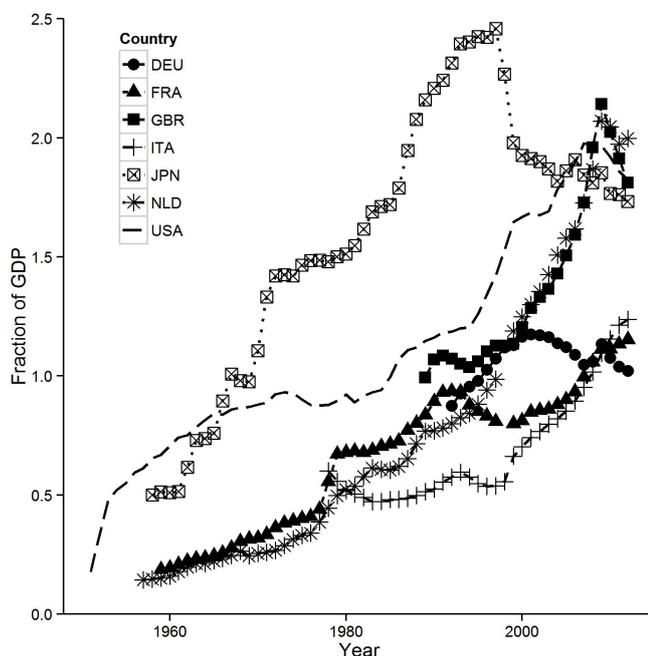
The paper by Arcand et al. (2011), discussed in section 4, finds that in a regression that includes linear as well as quadratic terms for credit to the private sector, the linear coefficient of their estimates remains positive and significant when shifting the time period over which they estimate the model, while they find a shifting effect over time if they include only a linear term. This suggests that the diminishing effect of credit to the private sector is at least partly due to misspecification of the model and the increase in credit to the private sector in many developed countries.

This would also fit with the stylized fact that the effect of financial development on growth is much lower in papers that include more recent data such as Rousseau and Wachtel (2011) Gantman and Dabos (2013) and Beck et al. (2013), compared to studies that use relatively older data, i.e., until 1995. Rousseau and Wachtel (2011) study the evolving nature of the relationship between finance and growth. They find that the effect of liquid liabilities on growth is larger for developed countries than for non-developed countries, but decreases considerably over time, by more than a factor of two compared to the period 1960-1989, and even becomes insignificant in the period 1990-2004. Gantman and Dabos (2013) use data for the period 1961-2005 for 98 countries. They apply system GMM combined with a wider range of controls and find no significant effect of financial development²³ on growth. Beck et al. (2013) confirm these findings. They apply OLS and find that for the years 1995–2007 financial development²⁴ is not significantly associated with growth.

²³As measured by total credit to the private sector by banks and other financial institutions.

²⁴As measured by the claims on the domestic private sector by deposit money banks as a share of GDP.

Figure 5: credit to the private sector in selected OECD countries



source - IMF financial statistics

4.2 Developing versus developed countries

Nonlinearity would also account for the result that the effect of financial development on growth seems to be smaller for more developed countries in papers that explicitly distinguish developing from developed countries. If the relation was nonlinear, the marginal effect of financial development would be lower in developed countries, because more developed countries are also financially more developed.

A couple of papers that have bearing on this issues use a frontier approach. These papers find that countries close to the frontier benefit less from financial development. The conclusion, however, depends on the measure of financial development used. Aghion et al. (2005) use a cross-section of 71 countries over the period 1960-1995 and add interaction terms between initial per-capital GDP relative to the US and credit to the private sector, liquid liabilities, bank assets and commercial bank versus central bank assets. Using legal origin as an instrument, they find that low financial development makes convergence to the efficient frontier less likely, while countries close to the frontier do not benefit from financial development. Méon and Weill (2010) study the effect of financial development on countries' relative distance to a common production frontier, for 47 countries over the period 1980-1995. They find that the relationship depends on eco-

conomic development and the measure for financial development used. More credit to the private sector increases efficiency only for the richest countries. The ratio of liquid liabilities to GDP²⁵ is insignificant for those countries, while increasing the ratio of commercial bank assets to central bank assets plus commercial bank assets significantly increases efficiency.

The papers distinguishing between high-income, middle-income, and low income countries generally find that the effect of financial development on growth is smaller or even non-existent for high-income countries. Gregorio and Guidotti (1995) use data for the period 1960-1985 for 100 countries and split the sample into high-income, middle-income, and low income countries. They find that the effect of financial development on growth in high-income countries is relatively small for the entire sample period, while it does not differ significantly from zero when considering the period 1970-85. Calderon and Liu (2003) use time-series analysis for 109 developing and developed countries from 1960 to 1994 to examine the direction of causality between financial development, as measured by credit to the private sector or broad money, and economic growth. They use Geweke decomposition, which measures the degree of dependence between two time series. They find that financial deepening contributes more to the causal relationships in the developing countries than in the developed countries. Rioja and Valev (2004b) apply GMM system estimates to 74 countries over the period 1991-1995. They group countries into low-income, medium-income and high-income countries. They find a significant and positive effect of private credit on growth for medium- and high-income countries, while the effect is insignificant for low-income countries. For liquid liabilities and the ratio of commercial bank and commercial plus central bank assets the effect is positive and significant only for high-income countries. Masten et al. (2008) study European countries using cross-country system GMM growth regressions for 31 countries over the period 1996-2004 and cross-industry RZ-regressions for 26 manufacturing industries in 30 countries for the period 1996-2003. Their cross-country analysis shows that financial development²⁶ does not significantly impact growth in non-transition countries. Their cross-industry analysis finds thresholds levels of 53% and 70% for the sum of stock market capitalization and domestic credit as a percentage of GDP, above which financial development no longer affects growth. All developed Western European countries were above that threshold in the period under investigation. Hassan et al. (2011) apply OLS to several sub samples²⁷

²⁵Defined as the ratio of currency plus demand and interest-bearing liabilities of banks and non-bank financial intermediaries divided by GDP.

²⁶Measured as either the sum of stock market capitalization and domestic credit in percent of GDP or domestic credit provided by banking sector in GDP.

²⁷East Asia & Pacific, Europe & Central Asia, Latin America & Caribbean, Middle East & North Africa, South Asia, Sub-Saharan Africa, high-income OECD, and high-income non-OECD.

of in total 168 countries in the period 1980-2007. Domestic credit to the private sector is significant and positively associated with growth in East Asia & Pacific and Latin America & Caribbean. For high-income countries they find a statistically significant negative relationship between domestic credit to the private sector and growth. Other papers that find a lower impact in developed countries are Beck et al. (2012), who find that the relationship between banking sector development and GDP per capita growth decreases in the level of economic development and turns insignificant for high income countries, and Beck et al. (2013), who find that increased financial development decreases volatility only for low-income countries. We discuss these papers in more detail in section 4.3 and section 4.4, respectively.

An exception in this body of literature is Deidda and Fattouh (2002), who only find a significant positive effect for developed countries. Deidda and Fattouh (2002) use the King and Levine (1993) data set (119 countries over the period 1960–1989) and estimate a threshold mode with income per capita as a threshold variable. In contrast to the papers we discuss below, they find that in low income countries there is no significant relationship between liquid liabilities to GDP and growth, whereas in high income countries the relationship is positive and significant.

Overall, the literature reviewed in this section suggests that the effect of increased financial development on growth decreases with the level of economic development in a country. This would be in line with decreasing returns to financial development.

4.3 Measuring Financial Development

A third potential reason for nonlinearities is that the measures commonly used in the literature may not capture increases in the efficiency of financial intermediation. The hypothesis relating finance and growth is that more efficient intermediation between borrowers and savers increases growth by lowering the cost of investment and improving the efficiency of allocation. Typically, studies take as a proxy for efficient intermediation variables that focus on size such as broad money, bank credit to the private sector, or stock market turnover. Although these variables may reflect the efficiency of intermediation for developing countries, this may not necessarily hold for developed countries. Rough measures such as bank credit to the private sector may capture efficiency at low levels of financial development, but not at higher levels.

The few papers that try to use alternative measures that indicate the quality of financial intermediation tend to find that it is quality that matters, not quantity. Indeed, Jayaratne and Strahan (1996) study the relaxation of intrastate branch banking restrictions that took place in the US primarily in the 80's. The authors use variation in the timing of branch deregulation across different states to identify the growth effects. Branch deregulation

resulted in 0.5–1.2 pp higher growth rates and the effect was persistent for at least a decade. They then ask whether this was due to increased quantity or quality of loans, as measured by the fraction of non-performing loans, the fraction of loans written off during the year, and the fraction of loans to insiders.²⁸ All quality measures improve significantly after deregulation, suggesting that improvements in the quality of bank lending was responsible for faster growth. Another relevant study, one which looks at the effect of deregulation on loan quality, is Bertrand et al. (2007). They use a firm-level panel of about 15,000 firms that spans the period 1978 to 1999 and study the deregulation of the French banking industry. They find a decline in bank debt for poorly performing firms, widening of the interest rate spread between poorly and better performing firms, and an increased sensitivity of firm exit to poor performance. Hasan et al. (2009) study the relation between financial development (as measured by bank credit to GDP) and growth for 11 European countries in the period 1996–2004 using system GMM. They include a measure of the ability of banks to intermediate funds, as measured by the banks’ efficiency relative to an efficient frontier, estimated from a translog stochastic frontier model. Depending on their exact specification, they find that there is no volume effect of finance (as measured by bank credit volume) on growth, or that it is much smaller than the quality effect. They do find a significant effect of stock market and bond market capitalization, as well as a positive effect of the level of concentration in the banking sector.

In an innovative study, Guiso et al. (2004) use the probability that households will be turned down when applying for a loan as an indicator for financial development to study the effect of differences in local financial development of regions in Italy on firm creation, firm growth, and regional growth. They find that financial development positively affects all these variables. Moving from the financially least developed region to the financially most developed region increases the probability of starting a business by 5.6 percentage points, firm growth by 5.7 percentage points, and aggregate growth by 1.2 percentage points. Small firms especially benefit by being able to grow faster.

Also, the crisis has shown that indicators such as credit to the private sector may be distorted by bubbles in the credit market. Indicators such as credit to the private sector may mistake misallocation of capital for more efficient financial markets. If different types of lending affect growth differently, studies that lump them together may lead to incorrect conclusions. Beck et al. (2012) decompose bank credit to the private sector into household and firm credit in order to distinguish the growth effects of these two types of credit. Their cross-country regressions for 45 countries from 1994

²⁸Insider loans are defined as extensions of credit to executive officers and principal shareholders.

to 2005 suggest that only bank lending to enterprises is linked to GDP per capita growth. The growth effect thus comes through enterprise rather than household credit. Also when applying the RZ-methodology, they find that industries that are more reliant on external finance grow faster in countries with higher levels of enterprise credit, while industry growth does not vary with the level of household credit.

Overall, it seems plausible that the traditional aggregate measures used in the literature do not capture financial development for developed countries such as the Netherlands. However, there is little research that tries to develop alternative measures of financial development and relate those to growth. For developed countries, it may be more appropriate to study the drivers of bank efficiency (as in Hasan et al. (2009)) or the drivers of efficient capital allocation. Examples of studies that look at capital allocation are Wurgler (2000) and Fisman and Love (2007). Wurgler (2000) constructs a measure of the extent to which a country increases investment in its growing industries and decreases investment in its declining industries. He argues that more financially developed economies should direct more resources to sectors with better investment opportunities. In a similar vein, Fisman and Love (2007) study whether industries with higher growth opportunities, as proxied by sales growth in the United States, grow faster in financially developed countries.

4.4 Stability versus growth

Finally, at high levels of financial intermediation the costs of more intermediation in terms of a higher probability of a financial crisis or increased macroeconomic volatility may also be higher. Studies assessing the relation between finance and stability, however, remain scarce. The key issue being that financial stability is difficult to measure. A substantial literature, which is outside the scope of this review, tries to find predictors of financial crisis. There is no agreement on measures of stability, nor on robust predictors of financial crisis, see e.g. Rose and Spiegel (2011), although there seems to be some evidence that growth of private credit is an important predictor of the probability of a banking crisis, see Schularick and Taylor (2012) and the reviews in Demirgüç-Kunt and Detragiache (2005) or Davis and Karim (2008).

A number of studies assess the relationship between financial development and macroeconomic volatility. Some of these studies suggest that a more developed financial sector may protect firms that are dependent on external finance from macroeconomic volatility. Firms located in countries where financial frictions are lower are better able to withstand macroeconomic fluctuations that are not associated with financial crises, such as recessions or business cycle fluctuations. Raddatz (2006) uses data on 70 manufacturing industries in 48 countries during the period 1981-1998 and

studies the impact of financial development²⁹ on firms' output volatility. He introduces an industry-specific measure that captures firms' short-term liquidity needs, defined as the ratio of inventories over sales. He finds that increased financial development reduces volatility sectors with greater liquidity needs, which can be due to stabilization of the output of firms or the number of firms. The first component turns out to be the most important. Similarly, Denizer et al. (2002) use data from seventy countries for the years 1956-1998 and find that countries with more developed financial sectors experience less fluctuations in real per capita output, consumption, and investment growth. The importance of banks in the financial system³⁰ explains consumption and investment volatility most robustly, while credit to the private sector best explains the volatility of consumption and output.

However, not all contributions agree that a deeper financial system reduces growth volatility. The smoothing possibilities provided of a deep financial system might reduce growth volatility but only up to a limit. Easterly et al. (2000) find that the relationship between financial development and growth volatility is nonlinear. More credit to the private sector results in less volatile growth for low levels of financial development, but at high levels the effect is reversed. They speculate that this might be due to increased risk, for example in terms of higher leverage of firms. At the same time, some papers find only weak evidence that financial intermediaries dampen the effect of terms of trade volatility. Beck et al. (2006) use a panel of 63 countries for the period 1960-1997 and use the volatility of the terms of trade and inflation to proxy for real and monetary volatility, respectively. They find weak evidence that financial intermediaries dampen the effect of terms of trade volatility, and some evidence that financial intermediaries magnify the impact of inflation volatility in countries where firms have little or no access to external finance through capital markets. Also, the link between financial development and growth may depend on whether countries are 'financially fragile' in the sense that they have experienced banking crises in the past couple of decades. Loayza and Rancière (2006) use data on 75 countries over the period 1960-2000 and study a panel error-correction model that describes both the long-run relationship between financial development³¹ and growth as well as the short-run behaviour in case of shocks. They find that will economic growth is positively linked to financial development in the long run, in the short run the relationship is negative. This result seems to be driven by countries that have experienced banking crises in the past. Especially in these countries, financial development has negative short-run effects on growth.

The volatility-decreasing effect of more developed finance may also hold

²⁹As measured by the ratio of credit by banks and other financial institutions to GDP.

³⁰As measured by the ratio of deposit money bank domestic assets to deposit money bank domestic assets plus central bank domestic assets.

³¹Defined as private domestic credit over GDP.

predominantly for developing countries. Beck et al. (2013) apply cross-country OLS to 77 countries for the period 1980–2007. They assess relationship between the size of the financial system (financial sector value added) and financial development (bank claims on the domestic sector) on the one hand, and GDP per capita growth and growth volatility on the other. They find that financial development decreases volatility only for low-income countries, while for high-income countries the sign changes and the coefficient becomes statistically insignificant. In addition, they find that a bigger financial sector increases volatility in high-income countries, while it lowers volatility in low-income countries.

Also, some studies find that banking crises have a larger negative impact on firms' growth the more dependent they are on external finance, and that this effect is stronger in countries with more developed financial markets and with more leveraged financial sector. Access to alternative financing sources such as foreign financiers may mitigate the impact of financial crises. Indeed, Kroszner et al. (2007) study manufacturing industries in 38 countries that experienced financial crises during the past quarter century, find that those sectors that are highly dependent on external finance tend to experience a substantially greater contraction of value added during a banking crisis in countries with deeper financial systems. The impact of banking crises on growth is larger for industries dominated by young firms and for industries with high levels of intangible assets. Dell'Ariccia et al. (2008) study manufacturing industries from 41 countries from 1980 to 2000 and test whether more financially dependent industries are hit harder during financial crises. They find that growth in such sectors is lower during banking crises, that differential effects across sectors are stronger in developing countries, and that the real effects of banking crises are more pronounced when access to foreign finance is more limited. Bijlsma et al. (2012) investigate whether the drying up of bank credit, that took place in 2008–2009, differed across countries with respect to the differences in their financial systems. The authors follow the RZ methodology and do panel analysis. They find that higher pre-crisis levels of leverage and higher pre-crisis levels of market liquidity were associated with a larger drop in credit to the real sector. The quality of accounting standards can mitigate the negative impact of recessions on the output of firms that depend more strongly on external finance. Braun and Larrain (2005) apply the RZ-methodology to 28 manufacturing industries in over 100 countries from 1963 to 1999. They find significant and large effects. In the group of countries with poor accounting standards, growth rates for more financially dependent industries are 1.7 pp lower in comparison with less financially dependent industries during recessions

Finally, some hypothesize that finance may grow too large if high rents earned in finance divert scarce human resources from other, more productive, activities. This would correspond to explanations for decreasing returns to financial development due to a trade-off, not between financial development

and higher volatility, but between increased financial development and distortions induced by rent seeking behaviour. Philippon and Reshef (2012) find a link between deregulation and the flow of human capital into finance. According to the authors, while until 1990 workers in finance earn the same education-adjusted wages as other workers, by that 2006 they earn an average premium of 50%. In a recent contribution, Kneer (2013) tries to assess empirically the allocation of financial liberalisation on the allocation of labour between sectors. She finds that increased financial liberalization corresponds to a fall in the value added growth of an R&D-intensive industry.

Overall, evidence on the relation between more developed financial markets (as measured by the traditional proxies) and stability for developed countries is mixed. The literature suggests a positive effect of financial development on volatility, which may, however, turn negative at very high levels of development. Also, while a developed financial sector protects businesses against business-cycle fluctuations, it can propagate shocks when a banking crisis hits.

5 The Impact of Market Structure

Many papers suggest there exists considerable heterogeneity across countries in the effect of financial development on growth. A number of papers we have discussed in section 4.2 find evidence of heterogeneity across countries.³² The structure of financial markets is one potential source of heterogeneity.³³ We evaluate what the finance and growth literature can teach us about the differential impact of markets and banks, the effect of competition and concentration, and the effect of government ownership on growth or on indirect indicators that are commonly assumed to be conducive to growth.

5.1 Markets versus Banks

One source of heterogeneity may stem from the varying importance of different financing channels across countries, an important one being market-based versus bank-based financing. Capital markets partially perform the same basic functions of financial intermediation as banks do: stock and bond markets provide size transformation, risk transformation, and liquidity transformation between savings and investments. They also facilitate efficient investments through information creation and dissemination, and they provide a form of corporate control. In this respect, stock markets

³²Papers that use time series methods to study the impact of financial development on growth generally find evidence of heterogeneity. These papers fall outside the scope of this review.

³³The level of development of countries can also be a source of heterogeneity, which we have discussed already in section 4.2.

promote growth along the same channels as banks do. Nevertheless, there are important differences between banks and markets, related to e.g. banks' role as delegated monitors and banks' ability to provide liquidity insurance. In essence, banks arise due to economies of scale in technologies that reduce imperfections in capital markets (see e.g. Freixas and Rochet (2008)). At the same time, markets may be limited in their ability to exert corporate control due to the inherently fragmented nature of ownership.

Historically, civil-law countries developed more bank-based financial systems whereas common-law countries developed more market-based financial systems (Ergungor, 2004).³⁴ Common law allows for precedent creation when laws are incomplete and is therefore better suited for conflict resolution and contracting under uncertainty. In comparison, civil law is more strict in interpreting the statutes and extra governance institutions—e.g., banks—are required to complement the rule of law when contracts are incomplete.

Today, most developed countries rely on both stock and bond markets as well as on banks for channelling savings into investments. However, there is considerable heterogeneity across countries in the relative importance of the two channels, while the importance of market-based financing has increased considerably over time in eurozone countries (see e.g. Bijlsma and Zwart (2012)).

Which arrangement is more beneficial for growth? Two often cited cross-section studies, Levine and Zervos (1998) and Demirgüç-Kunt and Maksimovic (1998), find that market liquidity is a better explanatory variable for growth than market size. Thus, it is not size but depth of the market that matters. In addition, their results suggest that the effect of market liquidity on growth is roughly twice that of bank credit to the private sector on growth. According to Levine and Zervos (1998), increasing the market turnover ratio by 10 pp increases growth by 0.3 pp while increasing the ratio of bank credit to GDP by the same amount increases growth by only 0.13 pp. Demirgüç-Kunt and Maksimovic (1998) ask whether financial and legal development allow firms to grow faster than what could be achieved using only internal or short-term financing. They find that law and order³⁵, the size of the banking sector, and market turnover have positive and significant effects. According to the authors, increasing the market turnover ratio by 10 pp increases the share of externally financed firms by 3 pp while increasing the ratio of bank assets to GDP by the same amount increases that share by only 1.6 pp.

More recent studies look at the channels through which financial development facilitates growth. One such recent cross-section study is by Wurgler (2000), who investigates whether financial markets improve the allocation

³⁴Common law is developed by precedent, i.e. through decisions of courts and similar tribunals, while civil law is based on a codified system.

³⁵As from the International Country Risk Guide.

of capital. The author computes the elasticity of investments with respect to growth opportunities on a per-country basis and establishes that more developed financial markets, as proxied by stock market capitalization and private credit, result in a higher elasticity and hence more efficient capital allocation. The author finds that, in general, the effect of private credit is some 2.5 times larger than the effect of market capitalization. However, stock market development better explains the within-year variation between the elasticities—tentatively pointing at a signalling role of stock prices to differentiate growth opportunities within the same year—while credit market development better explains the between-year variation of the elasticities.

Cross-section studies, however, provide consistent estimates only so long as all the omitted country specific variables, ranging from property rights protection to professionalism of monetary policy institutions, are independent from the considered regressors.³⁶ While some of the necessary control variables are usually included,³⁷ a comprehensive approach is clearly limited by data availability.

An alternative approach is therefore to focus on so-called within variation, which uses changes over time to identify the impact of finance on growth, as opposed to between variation, which relies on difference between countries. This can be done either in a time-series context (Arestis et al., 2001) or in a panel data context (Demirgüç-Kunt and Maksimovic, 2002; Beck and Levine, 2002).

Arestis et al. (2001) investigate, on a per country basis, if there is a long-run causality from financial development to growth and also compare the importance of markets relative to banks in this respect. The authors estimate a separate vector error correction model (VECM) for each of the following countries: Germany, the US, Japan, the UK, and France for the years 1974–1997 (quarterly data). First, the results differ between countries, which highlights a possible problem with all cross-country studies (whether cross-section or panel data analysis). No causal relationship from financial development to growth is found for the US and the UK, while Germany, Japan, and France exhibit one. Second, for the latter three countries the impact of bank development, as measured by credit outstanding, is three to seven times larger than the impact of market development, as measured by market capitalization, in stark contrast with the earlier findings of Levine and Zervos (1998) and Demirgüç-Kunt and Maksimovic (1998).

Demirgüç-Kunt and Maksimovic (2002) use their earlier methodology (Demirgüç-Kunt and Maksimovic, 1998), but apply it in a panel data context (a random effects estimator). Namely, they measure the proportion of firms that grew faster than what was possible with only internal financing,

³⁶Consistency is the property of econometric estimators that they converge in probability to the so-called population value.

³⁷Levine and Zervos, for example, account for GDP, education, political stability, government size, inflation, and black market prevalence.

in a given country in a given year, and then regress this proportion on standard indicators of financial development. In accordance with their earlier results, they find that market turnover has a stronger explanatory power than bank credit. Furthermore, the authors provide some evidence that markets facilitate long-term financing, whereas banks facilitate short-term financing.

Beck and Levine (2002) repeat the industry-level analysis of Rajan and Zingales (1998) and Wurgler (2000) for 42 countries but extend it with indicators of financial structure. The authors confirm the earlier findings that financial development positively influences the growth of financially dependent industries and fosters efficient capital allocation. However, they find no evidence that the indicator of how prevalent markets are in comparison with banks has any positive or negative influence on either growth or allocative efficiency. This confirms earlier findings of Levine (2002) in pure cross-country regressions.

In sum, there is no consensus in the literature that either banks or markets are to be preferred. Although the results of Wurgler (2000), and Demirgüç-Kunt and Maksimovic (2002) suggest a differentiated role of markets and banks – markets allow for identification of long-term investment opportunities, while banks provide efficient short-term financing over time for a given opportunity – this specialization is so weak that it does not matter for growth (Beck and Levine, 2002). The results of Arestis et al. (2001) hint at an explanation of why the specific form of a financial system turns out to be insignificant in cross-country studies: their estimates differ substantially from country to country.

5.2 Competition

Fig. 6 shows one imperfect proxy for competition, the level of concentration as measured by the market share of the five largest banks as a percentage of total banking assets, C5.³⁸ Concentration levels exhibit substantial variation across developed countries, but also show an upward trend. Other measures of competition also show substantial variation across countries (see for example Claessens and Laeven (2004)). What might be the consequences of these differences in levels of competition?

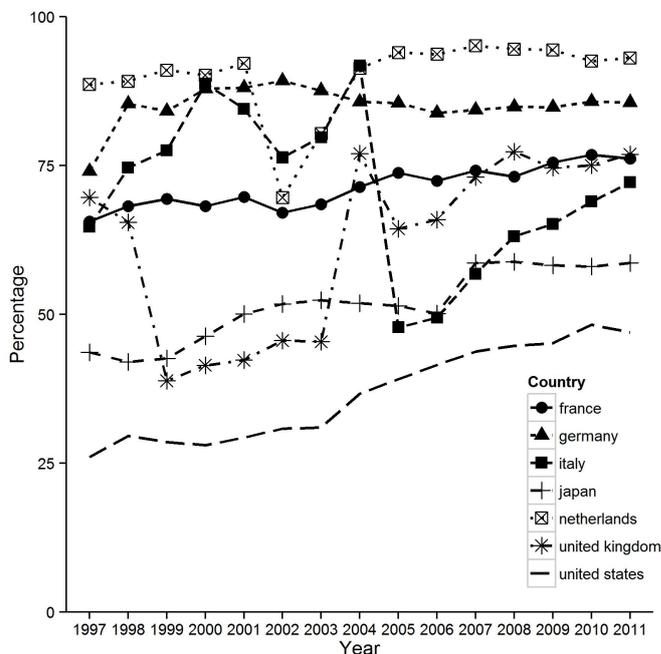
To address this question, this section discusses the literature that tries to connect competition and growth. What can the empirical literature teach us about the effect of increased competition on growth or indicators commonly assumed to be conducive to growth?³⁹

Interpreted broadly, literature on the relation between competition and

³⁸In principle, concentration should be measured at the level of markets for products in which banks actually compete.

³⁹We will not discuss the relation between competition and stability, which is the subject of an extensive literature (see for example Carletti and Vives (2009) and Beck (2008)).

Figure 6: Concentration as measured by C5 in selected OECD countries



Source: World Bank Global Financial Database

growth in banking is extremely large. On the one hand several measures of competition exist, not to mention that one can also study events that are expected to impact competition such as bank mergers, deregulation, or foreign bank entry. On the other hand, instead of looking at the effects of competition on growth directly we can also look at variables that are commonly assumed to be correlated with growth, such as new incorporations of firms, the efficiency of banks, pricing of business loans or retail deposits, the availability of credit for firms, the share prices of competitor banks or those of customers after merger announcements, or the pass-through of market interest rates.

Combining these different competition measures and outcome measures results in many different classes of studies. We will not discuss all of these studies and consider only a very limited part of this large literature, focussing on studies that focus directly on growth, studies that consider firm incorporations, and studies that address the effect of concentration on loan-rate levels.

A discussion on the relationship of competition between banks and the real economy should start with two important caveats. First, competition is hard to measure empirically. Several measures exist that—depending on the theoretical model used—provide some indication of the level of competition: concentration measures such as the Herfindahl-Hirschman index and

the Lerner index, the Panzar-Rosse H-statistic, Tobin's q, the Boone indicator, or conjectural variation models. A separate literature, the so-called new empirical industrial economics, focusses on estimating the level of competition directly.⁴⁰ Studies sometimes find different results depending on the type of indicator they use.⁴¹ Second, many measures of competition are at an aggregate level and do not distinguish between different markets (for example consumer loans versus loans to firms; loans to large firms versus loans to small firms, investment banking; or different types of products such as payment services, factoring and clearing services). Indicators of competition may differ substantially depending on the specific market under consideration. Obviously, these issues make it difficult to draw clear conclusions about the relationship between competition and growth.

Most studies do not investigate the impact of competition on growth directly. Those papers that do study the effect of competition on growth, look at the effect on sectoral industry growth using the RZ-methodology. Overall, these papers give mixed results that depend on the measure of competition used and on the type of heterogeneity introduced. Some papers suggest that increased concentration promotes growth in industries that are more dependent on external finance but hampers overall growth. Cetorelli (2001) studies 35 manufacturing industries in 17 OECD countries for the period 1986-1994. He finds that that in countries with more concentrated banking sectors, firms that are more dependent on external finance are larger. This effect is weaker in countries with more developed financial markets and more efficient legal structures. Cetorelli and Gambera (2001) studies 41 countries and 36 manufacturing sectors between 1980 and 1990. They find that concentration, as measured by the sum of the market shares of a country's three (five) largest banks, promotes growth in those industries that are more in need of external financing, but at the same time depresses overall growth.⁴² Other papers find no effect using different measures. Claessens and Laeven (2005) study manufacturing industries in 16 countries in the period 1980-1990. They find that industries that are more dependent on external financing grow faster in countries with more banking competition, as measured by the Panzar-Ross H-statistic. In addition, they find that these results do not hold when concentration is used to measure competition, which questions the validity of using concentration as a measure of competition. Potential explanations for these mixed results include depen-

⁴⁰See Degryse and Ongena (2008) for a review.

⁴¹Claessens and Laeven (2004) compute the Panzar and Rosse H-statistic for 50 countries for the period 1994-2001. They find monopolistic competition in most countries with H-statistics ranging between 0.6 and 0.8. They find no evidence of a negative relationship between bank system concentration and H. Instead, fewer entry and activity restrictions result in higher H-statistics and hence more competition.

⁴²The economy-wide effect is -2.6 percent. For the sector at the 25th percentile of the distribution of external financial dependence, the sector-specific effect is 0.8 percent. The net effect for such a sector is thus around -1.7 percentage points.

dence on the level of development and nonlinear in the level of competition. Deidda and Fattouh (2005) study 36 manufacturing industries from 41 countries over the 1980–1990 period. They find a negative effect of concentration on industrial growth in low-income countries, but statistically insignificant in high-income countries. Their results remain valid in a cross-country regression for per capita real GDP growth in 70 countries over the 1990–1999 period. Guevara and Maudos (2011) study 53 sectors in 21 countries over the period 1993–2003.⁴³ They use the Lerner index, the H-statistic, market concentration as measured by C3 and C5, and the HHI as measures of competition and find an inverted U-effect of bank market power on economic growth, with an optimum at an CR3 of about 80% or an HHI of about 0.2.

Instead of directly studying the impact of competition on growth, it is also possible to study the relationship with other characteristics thought to be correlated with growth, such as firms incorporation or the availability and price of credit.⁴⁴ Two competing points of view are that banks' market power can on the one hand restrict firms' access to credit by lowering the supply of loans and raising the interest rate, but on the other hand increase lending to informationally opaque firms because banks with monopoly power have a greater incentive to establish lending relationships with their client firms. We distinguish two strands of papers in this line of research.

A first strand of this literature looks at the effect of competition on firm creation. A first set of papers find an unambiguously negative effect of increased competition in terms of deregulation or concentration on firm incorporation. Indeed, Black and Strahan (2002) study the effect of deregulation on new business incorporations, using state-level panel data for the period 1976–1994. They find that new incorporations per capita rose both following deregulation of restrictions on branching and on interstate banking, by 3.8 percent and 7.9 percent, respectively.⁴⁵ Beck et al. (2004) use survey data for 74 countries on financing obstacles perceived by small, medium, and large firms. They find that in countries with more concentrated banking sector, firms are more likely to perceive finance as an obstacle to growth. The relation is insignificant in countries with high levels of GDP per capita, well-developed institutions, an efficient credit registry, or a high share of foreign banks. Cetorelli (2004) studies the effect of changes in the market share of the three largest banks (C3) on average firm size in 27 manufacturing sectors in 28 OECD countries over the period 1980–1997. He finds that firms in sectors where old firms rely more on external finance are disproportionately larger in countries with a more concentrated banking sector. This

⁴³They use the UK as a benchmark country instead of the US.

⁴⁴Another sizeable literature that is outside the scope of this review focusses on the effect of competition on banking characteristics.

⁴⁵A literature studying the effect of liberalisation on growth, firm incorporation etc. also exists. For example, Bertrand et al. (2007) study the effect of deregulation on industry dynamics.

suggests that a concentrated banking sector leads banks to focus funding towards a limited number of firms of large size.

However, the effect may depend on the causes of increased concentration, i.e., from a dynamic perspective it matters which banks merge. Francis et al. (2008) study new business formation in 394 labour market areas in the US in the period 1994–1999. As a measure of competition they use the HHI based on branch-level deposit information. In the short-run, they find that the intensity of consolidations initiated by large acquirers is negatively related to the rate of new business formation, but consolidations between small-to-medium sized banks have a positive impact. In the longer run the effect of consolidations on the rate of new business formation is positive. Also, at relatively low concentration levels an increase in banks' market power as measured by concentration leads to higher firm birth rates, as found by Dell'Ariccia and di Patti (2004). Using a panel of 22 industries in the 103 Italian provincial credit markets in the period 1996-1999, they look at the effect of concentration on firm birth rates in relation to firms' opaqueness (as measured by the ratio of gross total assets to gross physical assets). They find that, while some market power is beneficial to the creation of firms, too much has an adverse effect. In addition, highly opaque firms benefit more at the margin for low value of market power, while they are hurt less at the margin for high levels of market power.

In summary, all papers in the first strand suggest that decreased competition, as measured by several indicators such as deregulation, mergers, or concentration, tend to be detrimental to firm creation, but the effect may depend on which banks merge or on the level of concentration.

The second strand of literature we distinguish studies the impact of banking competition on the level of interest payments by firms. See for example table 1 in Degryse and Ongena (2008) or table 1 in Gilbert and Zaretsky (2003). We discuss below a selection of relevant papers. In summary, this literature generally finds that a less competitive banking sector leads to higher interest rates, but the size of the effect varies considerably across studies.

In a widely cited study, Petersen and Rajan (1995) study the effect of bank concentration on loan rates and the availability of credit for US small businesses in markets with varying levels of bank concentration. They find that young firms in concentrated banking markets receive more finance than similar firms in competitive markets. However, the difference tends to vanish as firms get older, suggesting that market power is beneficial only when information asymmetries are severe.

A substantial number of other studies, however, consistently finds that interest rates rise with decreasing competition as measured by proxies such as concentration levels, the HHI, or the number of local competitors. Hannan (1991) studies loan rates charged to US businesses in 1984, 1985 and 1986. He finds that interest rates on small commercial loans tend to be higher in

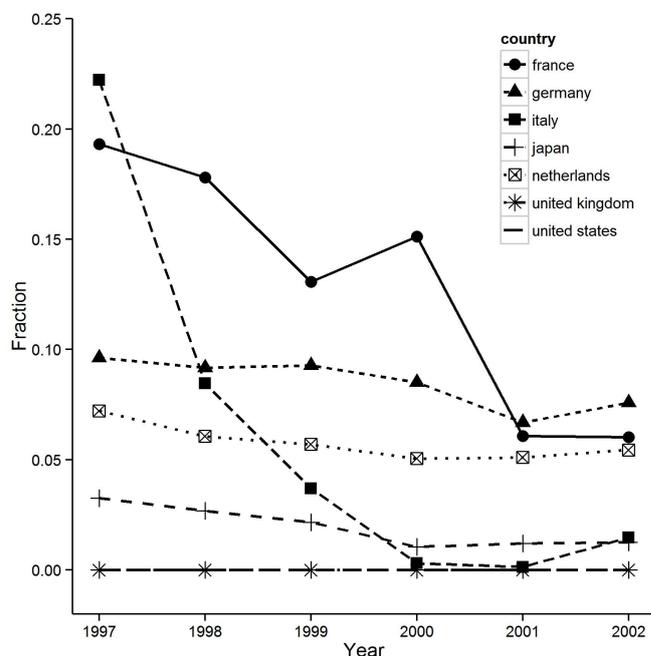
local markets with a more concentrated banking industry. Hannan (1997) studies loan rates charged to US business for loans under \$100,000 and finds higher rates in more concentrated markets. Decomposing the HHI into the effects of changes in the number of banks and the effects of asymmetry, he finds that the number of banks exhibits the strongest and most consistent impact on small business loan rates. Cyrnak and Hannan (1999) study 9,000 small business loans issued by 228 US banks operating in 98 local markets. They find a significant positive relation between the HHI and loan rates. A one standard deviation increase in the HHI raises interest rates on unsecured variable-rate loans by 47 bp. Mallet and Sen (2001) use a survey of Canadian small business loans. They find a negative relationship between the number of local competitors and small business loan rates.⁴⁶ Interest rates in areas with no other competitor and one other competitor are on average 17.6 and 15.1 basis points higher than in areas with four or more competitors. Corvoisier and Gropp (2002) study the relationship between bank retail margins and bank concentration for 10 European countries in the period 1993-1999. They find a positive correlation between interest rate margins and product specific measures of concentration. They conclude that increased concentration in Europe has raised banks' margins by 100–200 bp. Degryse and Ongena (2005) study 17,776 loans by one Belgian bank. They find that increases in the HHI have a statistically significant positive, but fairly small effect. An increase of 0.1 in the HHI would increase the loan rate by 3 basis points. Berger et al. (2007) study how market structure⁴⁷ affects the supply of credit to small businesses in the US. Using a large number of controls including market structure, bank size, market concentration, they find that a higher HHI corresponds to a higher interest rate spread.

Papers that use mergers as a measure of competition also find that interest rates rise with decreasing competition. Indeed, Hannan and Prager (1998) consider nine mergers that significantly increase the HHI in the targets' markets and find that the spreads increase significantly after these mergers. Sapienza (2002) studies the effects of banking mergers on individual business borrowers for Italian banks. The author finds that increased efficiency of the consolidated banks can lower interest rates, but as the local market share of the acquired bank increases, the efficiency effect is offset by market power. Erel (2011) looks at the effect of US commercial banks mergers on loan spreads. He finds that even though market overlap of merged banks increases cost savings and consequently lowers spreads, loan spreads widen when the market overlap between merged institutions is sufficiently large.

⁴⁶As a measure of competition they use the number of competitor banks within a close proximity of a given customer.

⁴⁷Defined as the distribution of market shares of different size classes of firms in a local market, where the sizes are inclusive of assets both within and outside the local market.

Figure 7: Government ownership in selected OECD countries



Source: Micco et al. (2007), data can be downloaded at http://www.iadb.org/res/files/data_app_mpy.xls

5.3 Government Ownership

Fig. 7 shows the development of the average share of bank equity capital held by governments from 1997 to 2002. The figure shows substantial variation between countries as well as a generally decreasing trend. The financial crisis has stopped and even reversed this trend: according to Iannotta et al. (2013) in a sample of the largest Western European banks by asset size, the average share of bank equity capital held by governments increased from 5.4 pp at the end of 2007 to 7.3 pp at the end of 2009.

How should we value government involvement in banking in developed countries? In this section we discuss the empirical literature on the relationship between government ownership of banks and growth, efficiency of capital allocation, and bank efficiency in developed countries.⁴⁸

A number of cross-country studies find that government ownership is either associated with less developed financial markets or with lower growth. Barth et al. (2001) apply cross-country OLS to a panel of 66 countries.

⁴⁸A literature on mutual versus stock ownership also exists, see the discussion in Altunbas et al. (2001), which is outside the scope of this review. Also, we ignore studies on developing countries because we are interested in policy consequences for developed countries. There is also an emerging literature on government ownership and risk, see Illueca et al. (2013) for an example of a study on Spanish banks.

They conclude that state ownership of banks tends to be negatively associated with financial depth as measured by the ratios of bank and non-bank credit to the private sector over GDP, and by the value of securities traded domestically, even after controlling for economic development and the quality of government. Cetorelli and Gambera (2001) apply the RZ-methodology to 36 industries in 41 countries for the period 1980-1990. Using a dummy variable equal to one if the share of state-owned banks is above a certain threshold, they find that firms that depend on external finance grow less in countries with a high level of state-owned banks. In an influential paper, La-Porta et al. (2002) construct data on government ownership of the 10 largest banks in 92 countries for the years 1970 and 1995. They find a significant and negative effect of government ownership in 1970 on financial development, on economic growth, and on productivity growth.⁴⁹ The effects are stronger for less developed countries. Like Cetorelli and Gambera (2001), Galindo and Micco (2004) also apply the RZ-methodology to 20 industries in 33 countries, but they distinguish between aggregate credit to the private sector provided by state owned and by private banks. They find that only for private banks does a higher level of credit significantly increase growth in industries that rely more on external funding. Finally, Beck et al. (2004) use survey data on growth and obstacles to financing as perceived by small, medium, and large size firms for 74 countries. They find a stronger negative effect of concentration on financing if the share of government-owned banks is large.

However, some researchers question the validity of such cross-country studies, arguing that they suffer from omitted variable bias. Indeed, Andrianova et al. (2012) argue that institutional quality may be an important omitted variable. They find that once institutional quality indicators are added, in the period 1995–2007 government ownership of banks has been associated with higher economic growth in weak institutional environments.

A second group of studies looks at the effect of state ownership on allocative efficiency and evaluate how ownership structure impacts efficiency. These studies provide some evidence of lower efficiency in economies with a higher share of government ownership of banks. Morck et al. (2011) follow Wurgler (2000) in their measure for the efficiency of the allocation of capital. In cross-country regressions banking systems have lower capital allocation efficiency as well as a higher level of non-performing loans. Capital accumulation is also significantly reduced. However, in cross-industry regressions, the market share of state-controlled banks does not significantly impact the growth of firms that depend more strongly on external finance. Taboada (2011) studies the effect of ownership changes on the allocation of capital

⁴⁹As measured by, respectively, the growth of private credit to GDP and the change in stock market capitalization to GDP; the average annual growth rate of GDP per capita in 1960–95; and GDP growth corrected for physical capital and human capital growth.

within countries based on the ownership structure of the top 10 banks in 63 countries in 1995, 2000, and 2005. Defining capital allocation efficiency as the extent to which investment increases in growing industries and decreases in declining industries. The effect of divestment of governments stakes in banks depends on who takes over the stakes. Efficiency only improves when foreigners take over market share, but decreases when domestic block holders step in.

A third strand of the literature looks at the impact of ownership on efficiency of banks, for example by studying profitability or estimating cost functions of banks.⁵⁰ The evidence in this respect is mixed. Some papers find that government banks underperform relative to privately owned banks Berger et al. (2005), using quarterly information on Argentine banks from 1993 to 1999, study the effect of bank ownership and changes in bank ownership on efficiency.⁵¹ They find that state-owned banks on average have poorer long-term performance (and especially high nonperforming loan ratios), while privatisation of state-owned banks leads to significant improvements in nonperforming loans and profit efficiency. Altunbas et al. (2001) study cost and profit efficiency of German banking between 1989 and 1999. They estimate a stochastic frontier model for different ownership types. They find that public savings banks and mutual cooperative banks are slightly more cost and profit efficient than their private sector competitors, which may be due to their lower cost of funding. Sapienza (2004) uses micro data on individual bank loans to study the lending behaviour of 85 Italian privately and publicly owned banks. She finds that state-owned banks charge lower interest rates than privately owned banks, but that firms borrow more from the latter. Also, state-owned banks favour large firms and firms located in depressed areas, while politics also plays a role. The stronger the political party affiliated with a bank in the area where the firm is borrowing, the lower the interest rates. Iannotta et al. (2007) compare the performance and risk of a sample of 181 large banks from 15 European countries in the period 1999–2004 on profitability, cost efficiency and risk. They find that mutual banks and government-owned banks exhibit a lower profitability than privately owned banks, in spite of their lower costs. In addition, public sector banks have poorer loan quality and higher insolvency risk, while mutual banks have better loan quality and lower asset risk.

Other studies, however, find no difference in efficiency between state owned and privately owned bank, or even that the former outperform the latter. Crespi et al. (2004) study return on assets (ROA), total net profit after taxes, and profits from regular banking operations before taxes of Spanish

⁵⁰We focus on papers that include developed countries in their sample.

⁵¹They use five different indicators of efficiency: profit efficiency rank, return on equity, cost efficiency rank, and costs over assets and non-performing loans.

banks in between 1986 and 2000. They find that government owned savings banks perform better than commercial banks. Micco et al. (2007) compare the performance of banks as measured by looking at the return on assets (ROA), the interest margin over total assets, overhead costs over total assets and the number of employees over total assets. In industrial countries, the performance of publicly-owned and private banks only differs significantly for overhead costs over total assets. Caprio et al. (2007) assess the impact of shareholder protection laws and ownership structure on bank valuations as measured by Tobin's Q and the ratio of the market value to the book value, while controlling for international differences in bank regulation of 244 banks across 44 countries. They do not find a significant effect of state ownership on bank valuations.

One potential explanation for these mixed finding is the possibility that public and private banks have different objective functions, for example due to political pressure. In addition, public banks may benefit from lower funding costs. These differences may also result in different lending behaviour. Indeed, Bertay et al. (2012) study the cyclicity of bank lending using individual bank balance sheet data from 1999-2010. They find that lending by state-owned banks is less procyclical than lending by private banks, especially in countries with good governance.

Finally, a number of papers study the effect of privatization on bank performance.⁵² Overall, these papers find that performance improves after privatization, while rival firms experience a drop in share prices. However, performance may decline in the post-privatization years. Verbrugge et al. (1999) study the effect of privatisation on bank performance⁵³ for 12 developed and 13 emerging economies. They find limited improvement in bank performance after privatization, which they argue is due to the remaining substantial level of government ownership that often remains. Otchere and Chan (2003) study the case of the Commonwealth Bank of Australia on the bank's. They find that the financial and operating performance of the bank significantly improved after privatization, and the more so as government ownership shrank. Otchere (2009) compares the returns and operating performance of privatized banks with those of rival banks for 56 privatizations between 1981 and 1999. He finds that privatized banks in developed countries experienced significant improvements in operating performance, and shareholders of rival banks lost on average 0.26 pp of their wealth on the announcement day. Choi and Hasan (2011) compare the performance of privatized banks with that of established private banks in 30 countries for the period 1994-2005. They find that privatized banks experience and improvement in performance, but that performance gradually declines over

⁵²Again we ignore papers focussing on developing countries such as Bonin et al. (2005).

⁵³As measured by profitability, interest margin, profit margin, non-interest revenue, total income as a percentage of assets, loan output, non-interest operating expense relative to assets non-deposit debt-to-assets and capital-to-assets ratios.

the three years following privatisation for most performance indicators.

6 Conclusion

The relatively optimistic pre-crisis interpretation of the empirical literature is being replaced with a more cautious one. In particular, there is no evidence that increases in the measures traditionally used as proxies for financial development will enhance growth in developed countries. This lack of impact of financial development is related to decreasing returns to financial development.

Several compounding effects explain decreasing returns: (1) at higher levels of financial development the low-hanging fruit has already been reaped; (2) more credit often goes hand-in-hand with a partial misallocation of that credit; (3) at higher levels of economic development, traditional measures no longer capture the level of financial development; and (4) bigger financial sectors may also increase the risk of a banking crisis or macroeconomic volatility.

Although the literature provides limited guidance to answer the question “How can government intervention stimulate efficient financial intermediation?”, we draw the following conclusions: (1) the beneficial effect of increased efficiency of finance comes mainly through increased lending to firms not through increased consumer credit; (2) high concentration levels increases loan rates, although small firms may benefit from the presence of a large bank; and (3) government ownership of banks negatively impacts efficiency.

This suggests that policy makers: (1) should focus on lending to firms instead of consumers; (2) should avoid too high concentration levels, although competition can still be present if there is a substantial threat of foreign entry; and (3) should keep government ownership of banks at a minimum.

Appendix

In this appendix we explain how Fig. 1 and Fig. 2 are constructed. The figures are based on the estimates from 12 papers; these papers are listed in Table A.1. For each paper, we reconstruct their original financial regressors using data from IFS (via Datastream) and World Bank. We use data for 33 OECD countries (excluding Slovenia due to some data problems). Let β_{ij} denote the estimate of the coefficient on regressor i from paper j ; we assume β_{ij} to be a normally distributed random variable with the mean and standard deviation as in Table A.1. Let x_{ijct} denote the value of regressor i from paper j for country c at time t . We average the financial regressors over 2000–2012 and we compute the predicted growth rates relative to the OECD average. So, let

$$\bar{x}_{ijc} = x_{ijc} - \frac{\sum_c x_{ijc}}{\sum_c 1}, \text{ where } x_{ijc} = \frac{\sum_{t=2000}^{2012} x_{ijct}}{13}.$$

Let g_{jc} denote predicted growth rate in country c (relative to the OECD average) according to paper j . We have

$$g_{jc} = \sum_i \beta_{ij} \bar{x}_{ijc}.$$

Each variable g_{jc} is normally distributed. We can compute its mean, however we can not compute its exact variance: while all the papers report variance per regressor, covariance matrices are never reported. Given the absence of these data, we simply assume zero covariates. Thus,

$$\begin{aligned} \mu(g_{jc}) &= \sum_i \mu(\beta_{ij}) \bar{x}_{ijc}, \\ \sigma^2(g_{jc}) &= \sum_i \sigma^2(\beta_{ij}) \bar{x}_{ijc}^2. \end{aligned}$$

In practice, financial regressors are positively correlated. Therefore, their coefficient estimates are negatively correlated. Ignoring these negative correlations, we overestimate the variances of predicted growth rate in comparison with the true estimates from the respective papers.

Fig. 1 plots g_{jc} per paper j given $c = \text{“The Netherlands”}$. To make Fig. 2, we need to combine the results from various papers. We assume that with equal probability one of the papers is correct in its assessment while others are incorrect.⁵⁴ We have

$$g_c = g_{\eta c},$$

⁵⁴Simply averaging g_{jc} over j is wrong. Imagine all the papers give the same mean and variance estimates, i.e. the literature is in a perfect agreement. The variance of the average will go to zero as the number of papers goes to infinity, which in this case is clearly misleading.

where η is uniformly distributed over the set of papers, i.e. over $\{1, \dots, 12\}$. Note that g_c is no longer normally distributed:

$$\mathbb{P}(g_c < y) = \sum_j \mathbb{P}(\eta = j) \mathbb{P}(g_{\eta c} < y | \eta = j) = \sum_j \mathbb{P}(g_{jc} < y)/12.$$

While $\mu(g_c) = \sum_j \mu(g_{jc})/12$, we use simulations to compute the confidence intervals. Fig. 2 plots g_c for a selected group of countries.

Table A.1: Papers for Meta-Analysis

Paper	Table	Regressor (original name)	Coefficient (st. error)	
Arcand et al. 2011	5 (column 4)	PC ^b	3.628	(1.726)
		PC2	-2.021	(0.729)
Beck et al. 2000	2 (column 4)	Private Credit ^{a,b}	1.443	(0.44)
Beck et al. 2013	4 (panel B, row 1)	Intermediation ^{a,b}	0.173	(0.239)
De Gregorio and Guidotti 1995	1 (column 1)	CREDIT	1.8	(0.8)
Gantman and Dabós 2012	4 (model 3, column 1)	Ln. priv. cred. ^{a,b}	0.262	(0.452)
King and Levine 1993	IX	LLY	3.4	(0.9)
		BANK	2.8	(1.1)
		PRIVATE	1.6	(0.9)
		PRIVY	3.7	(1.1)
		BANK	5.6	(1.1)
Levine 1998	4 (row 1)	BANK	5.6	(1.1)
Levine and Zervos 1998	3	Bank Credit	1.31	(0.55)
		Turnover	2.69	(0.9)
Levine et al. 2000	4 (row 1)	LIQUID LIABILITIES	2.163	(0.66)
		COMMERCIAL-CENTRAL BANK	4.642	(1.41)
		PRIVATE CREDIT ^b	2.185	(0.66)
McCaig and Stengos 2005	3 (row 4)	Private Credit ^{a,b}	1.512	(0.46)
Rioja and Valev 2004	2a (column 1)	Private Credit ^b	3.7	(1.12)
Rousseau and Wachtel 2011	3 (column 3)	Private sector credit ^b	-0.1	(0.5)

^a In log-form.

^b Equals private credit as defined in Levine et al. 2000.

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